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Young children prefer to match in terms of color rather than form, and between the ages of 4 and 7 years they shift to a preference for form. A current explanation posits that the shift is an adaptive response by the young child to classroom stimuli, which stresses attention to form. In order to test this hypothesis, 120 children (5- and 6-year-olds) of lower socioeconomic status were given a stimulus preference text. Sixty of these children were enrolled in Head Start classes; the others were eligible but were not enrolled in school. Twenty of the Head Start subjects were Anglo, 20 were Negro, and 20 were Indian. The same was true for the nonschool group. The test was given at several points during the school year, and it was expected that at the first testing of each group there would be no difference in the number of form responses given. On the final testing, however, it was expected that the school group would respond to form significantly more often than the nonschool group. The results confirmed the hypothesis: school children showed a steady increase in form responses across the school year, while the nonschool children did not. Analysis of race showed that Negro school children shifted from color to form much slower than did Anglo and Indian school children. Twenty-seven tables or graphs and a bibliography are included. (Author/DO)

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PART OF THE FINAL REPORT

to

THE OFFICE OF ECONOMIC OPPORTUNITY

(Contract No. OEO-4115)

CHILD DEVELOPMENT EVALUATION AND RESEARCH CENTER

John Pierce-Jones, Ph.D., Director

The University of Texas at Austin

August, 1968

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A C K N O W L E D G M E N T S

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Special appreciation goes to my wife, Ellen, for perservering not only through the writing of this dissertation, but through the whole extracting experience of earning a Ph.D.

C.M.S.

The University of Texas
at Austin

July 1968

A B S T R A C T

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Charles Mac Spellmann, Ph. D.
The University of Texas at Austin, 1968

It has long been noted that young children prefer to match in terms of color rather than form, and that between the ages of 4-7 years shift to a preference for form. Several explanations of this shift have been given. The current explanation offered by the writer posits that the shift is an adaptive response by the young child to classroom stimuli, which stresses attention to form. In order to test this hypothesis, 120 five- and six-year old children of lower socioeconomic status were given a stimulus preference test. Sixty of these children were enrolled in Headstart classes; the others were eligible, but were not enrolled in school. One-third of all the Ss were Anglo, one-third were Negro, and one-third were Indian. The test was given at several points during the school year, and it was expected that at the first testing of each group there would be no difference in the number of form responses given. On the final testing, however, it was expected that the school group would responsd to form significantly more often than the nonschool group.

The results confirmed the hypothesis: school children showed a steady increase in form responses across the school year, while the nonschool children did not. Size, also a dimension of the test, was a poor third choice by all children. Analysis of race showed that Negro school children shifted from color to form much slower than did Anglo and Indian school children.

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C H A P T E R I

INTRODUCTION

The purpose of the present investigation is to test the implications of a hypothesis concerning the factors contributing to the relative preference of form, color, and size in children. As will be discussed in detail shortly, a number of studies have been conducted in which children have been presented with stimulus materials to which they may respond on the basis of more than one dimension, the child's predominant choice being designated as his form, color, or size "preference." Most of these investigations have compared only two of the three dimensions mentioned above, namely form versus color. The results of these studies suggest that within the age range of 4-7 years, children tend to shift in preference, color choices predominantly occurring in those of younger ages and form choices in those of older ages. It is suggested by the present writer that this shift in preference is primarily the result of

experiential factors, and even more specifically, of factors encountered in the school situation. In order to test this hypothesis, color-form preferences were measured in children enrolled in Headstart programs at three different points in time during their first nine months of school experience. It was anticipated that, in contrast to children not enrolled in any school program, the proportion of children preferring form over color would systematically increase over the school year.

Relatively little attention has been given in the literature to the relative preference of children for size as opposed to color or form, and no reliable information is available about the changes, if any, that occur with age. In an effort to provide more empirical data about this dimension, size as well as color and form were investigated in the present study.

Before discussing the present experiment in more detail, it will be convenient to present more extensively the relevant empirical evidence. The data related

to color versus form preference in children will be considered first.

As was stated above, the evidence suggests that there is a systematic shift from color to form preference with age. Brian and Goodenough (1929) required 474 Ss ranging in age from 14 months to adulthood to sort a series of objects into categories, correct sorting being possible on the basis of either form or color. The results suggested a rather complex relationship with age: Form preference (i.e., sorting by form rather than color) was first predominant, followed by a shift to color, and finally, by a shift back to form. For example, of the children 30 months old, 84 percent were reported to prefer form. This form preference tapered off rapidly, with only 29 percent of the Ss preferring form at age 5. At age six, 66 percent preferred form, at age seven, 58 percent, and thereafter the proportion of form responses steadily climbed, reaching 90 percent at adulthood.

In a similar study (Colby and Robertson, 1942), the stimulus preferences of 158 children aged 3-1/2 to 10

years of age were measured. Each S was shown a series of cards with different geometric forms and colors on them, as well as a series of smaller cards with only one figure on each one. They were instructed to match each of the figures on the small card with one of those on the large card. Matching could be done on the basis of either form or color. The results showed a steady trend with age toward matching by form. Approximately 76 percent of the oldest group consistently matched by form, while only 26 percent of the youngest were consistent form-responders. Most of the other Ss in each age group were mixed responders, sometimes matching by color and sometimes by form.

Corah (1964) employed a task of cards with stimulus figures at the top and two comparison figures below, one matching in color and the other in form. Two groups of children, one ranging in age from about 4-8 years and the other from about 8-10 years, were tested. Again, the results strongly confirmed the fact that there is a shift from color to form; most of the younger

children preferred color, while the older children nearly all preferred form.

Suchman and Trabasso (1966a), using a similar test to that of Corah tested preschool Ss from a private nursery school and kindergarten classes; their age range was from 3 to 6-1/2 years. The results showed that there was a significant trend over age from color to form. The age at which children chose form as often as color was about four years.

The studies just cited suggest that there is a shift from color to form preference at some time within the age range of 4-7 years. Older studies (e.g., Descourdres, 1920; Katz, 1914; Vokelt, 1925), using similar methods, have found essentially the same results. Disregarding the question of whether or not children age 30 months and below prefer form, as suggested by Brian and Goodenough (1929), there seems little doubt that children do experience a shift in their stimulus preference as regards form and color.

A number of interpretations have been made of these results. Perhaps the earliest explanation that was

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offered is that the shift from color to form is a correlate of cognitive growth. As early as 1914 Katz attributed superior intellectual development to the form-dominant Ss among the children in his study. Brian and Goodenough (1929) and Colby and Robertson (1942) also suggested that form matching was associated with high intelligence test scores. However, none of these studies provided any formal data in support of this contention.

In another study (Engel, 1935), a group of elementary school children was divided into three levels of intelligence on the basis of prior school performance. It was found that the most intelligent group gave the greatest percentage of form responses. In contrast, Honkavaara (1958) reported that color matching is related to high intelligence. However, the latter evidence is at best suggestive; the only statistics reported were descriptive ones and the intellectual grouping of the Ss was inferred from school background. Thus, although there has been a good deal if discussion of the relationship between color-form perception and intelligence,

these early studies failed to provide any direct evidence by attempting to measure intelligence.

In a recent study (Corah, Jones, and Miller, 1966), the suggested relationship between intelligence and form preference was tested more formally. The Ss were 48 children ranging in age from 45-65 months with a mean age of 57 months. The test consisted of 18 stimulus plates on which a color or form match could be made. The Peabody Picture Vocabulary Test was used as the measure of intelligence. In the same study, 40 third grade children were also tested for form-color preference; IQ scores were obtained from these Ss with the Stanford-Binet. In neither group was IQ found to be significantly related to preference for form or color matching. Another recent and carefully controlled study (Suchman, 1966) studied deaf and hearing children, ages 8-12. Again, no significant relationship was found between color-form preferences and IQ.

The evidence at hand regarding the relationship of intelligence to form matching is not in complete agreement. However, if one were to place more weight on

the later, more carefully done studies, there does not seem to be a relationship between form preference and intelligence.

Another interpretation of the shift from color to form that is closely related to the above has been put forth by Corah (1964) and is based on the assumption that the attentional process involved in color matching in young children is analogous to Piaget's (1950) process of centration. According to Corah, the child's attention is centered upon the dominant color characteristic of the stimulus configuration. With age, the child's perception becomes decentered and he attends more readily to form. Since decentered perception is assumed to be a more highly developed genetic process than centered perception, it would be expected, Corah suggested, that children who typically decenter their perception will demonstrate greater discriminative ability in all areas of perception than children who typically center their perception. To test this hypothesis, Corah, Jones, and Miller (1966) obtained a group of 24 preschool color responders and a group of 24 preschool form responders

on the basis of their performance on a color-form matching test. These Ss were then required to take a form discrimination test and a color discrimination test. These two tests essentially consisted of four figures drawn on a series of cards with one of the figures differing in either form or color. Differences between the one "different" and three identical figures on each card were progressively more difficult to discriminate. It was found that form responders were able to discriminate both form and color with significantly greater accuracy than were color responders. The results would seem to support the concentration theory, but opposed to this interpretation are the findings mentioned earlier of Brian and Goodenough (1929). Their results suggested that below the age of 30 months children preferred form and this finding is not consonant with the proposition of Corah, et al., which proposes a progressive decentration process.

Also disagreeing with Corah, et al., above are the data of Suchman and Trabasso (1966b). Studying young children, they hypothesized that if a child's preferred

dimension (form or color) was relevant in a problem task, then the solution of that task would be facilitated. On the other hand, if the relevant dimension of the problem was not the preferred dimension of the child, then problem solving would be retarded. This expectation was confirmed. Especially pertinent to the present discussion was the finding that color responders committed fewer errors than form responders on tasks requiring color discriminations. These results are contrary to those reported by Corah, et al., who found that form responders excelled on both form and color tasks.

When all the evidence regarding the development of a centration process as being responsible for the shift from color to form has been considered, there does not seem to be sufficient basis for accepting it as the major cause of the shift.

Still another interpretation has been contributed by Schactel (1959). Color perception, he states, is more primitive because it lies close to the level of feeling and emotion, while form is more related to cognitive and connative processes. In infancy and early

childhood, colored stimuli, by virtue of this emotional stimulus value, have a higher segregating power than contour or form. No direct evidence bearing on Schactel's hypothesis is available, but the results of a study by Keehn (1953) has implications which appear contrary to Schactel's thesis. Keehn administered 26 different color-responding tests to 200 Ss, including the Rorschach Inkblot Test. Users of the Rorschach Inkblot Test have for years considered responses to color as qualitatively different from responses to form. Responses to color represent an orientation on the part of the subject to the more effective aspects of stimuli. A factor analysis on the test scores was done by Keehn, and two factors were extracted. The first was reaction or nonreaction to color, which Keehn designated as a color-form factor. The Rorschach color score had no saturation on this factor. The second factor was identified as one of whole-part reaction. Keehn concluded, on the basis of this evidence, that Rorschach color responses depend not on color reaction per se, but upon reaction to the stimulus as a whole. On the basis of

this work, then, color responding of the kind used in the present study should not be taken as a measure of emotionality.

Another explanation has been offered by Kagan and Lemkin (1961) who state that color preference reflects less "implicit labeling" or verbal mediation. In their study, 79 nursery and elementary school children ranging in age from 4-8 years were tested. The test consisted of 9 cards with 3 stimuli per card which required the S to use form, color, or size in classifying the stimuli into conceptually similar groups. The results showed that nearly all the children preferred form over color (and size) as a basis of similarity. For boys there was no age difference, but older girls were less likely than younger girls to use color as a basis of conceptualization. Since girls are usually more verbally facile than boys and since the older girls preferred form more than the older boys (as well as the younger girls), the writers concluded that the older girls were conceptualizing by implicit labeling of forms by name.

Although a number of explanations have been offered for the shift from color to form preference, little direct empirical evidence has been gathered to test their implications, and what evidence is available fails to give unequivocal support to any of them.

It should be noted at this point that preference for one dimension over another does not necessarily imply that a child cannot respond to the nonpreferred dimension, if required to do so. Kagan and Lemkin (1961), for example, tested Ss aged 4-8 years for color, form, or size preference. Nearly all of his Ss preferred form, but when form was not available as a choice on a test card, 80 percent of the Ss could choose on another dimension (i.e., color or size). They found that over 80 percent of the Ss could successively match objects on a dimension different from their initially preferred one. After a great deal of work with form-matching using the Weigl-Goldstein-Scheerer Color Form Sorting Test, its authors (1941) concluded that "every normal child" possesses the basic categories of form and color.

Returning to the explanations that have been offered for the shift from color to form preference, the present writer suggests that experience may be the most important determinant of this switch in preference. The most significant event happening at about age 5 or 6 is the beginning of school. As discussed above, children of school age are able to discriminate in terms of either dimension. However, the present writer suggests they may change their preference to form as they find this dimension yields more relevant information than does color or size. That is, in the classroom a child finds that many tasks require him to pay more attention to form characteristics than to color or size. Thus, he may adapt to the classroom situation by adopting a perceptual style which allows more fruitful interaction with academic demands. For example, the child is learning the alphabet in written as well as auditory form, how to write, etc. These tasks confine his attention to form rather than color and size. The color of the crayon used to make the letter K, for example, is irrelevant for its recognition, as is the size of the letter. The child in effect is learning an adaptive rule about his environment. Color

and size are less important than form for most of the instructional tasks or skills the 5- or 6-year-old child is required to master. The primary purpose of the present study is to test an implication of this hypothesis, namely that shifts from color to form preference will occur during a child's first year of school. It was felt that although rigid manipulation of classroom variables might have produced the shift in stimulus preference and provided support for the hypothesis, a naturalistic approach would provide stronger evidence. It has not yet been empirically established that the shift occurs concomitantly with classroom experience. When that is established then attention may be turned toward a delineation of the specific factors involved within the classroom.

An attempt will also be made in the present study to determine whether there are any systematic shifts during the child's first year of school for size as opposed to color or form. As was indicated earlier, this dimension has been relatively neglected, and about all that can be said at the present time is that size

seems to be less salient an organizational cue than color or form for the very young child. Suchman and Trabasso (1966a), using a test very similar to that of the present writer which measures preferences for size as well as form and color, found that size preferences were "virtually nonexistent" among their Ss, aged 3 to 6-1/2 years. Form responders chose size as often as color at all age levels; color Ss preferred form over size and this preference increased with age. Their data suggest an emergence of a second order preference, or choice hierarchy, among color Ss, but not among form Ss. Within the limited range tested, the results revealed no significant relationship of age to size preferences. Kagan and Lemkin (1961), using similar methods, also found that size was rarely chosen by children aged 4 to 8-1/2 years. Again, no relationship was found between age and size choices. Long (1941) attempted to train children between the ages of four and seven years to discriminate a large stimulus from a small one. His Ss required from five to 437 trials to succeed, indicating that size is a difficult concept for young children to use. Lee (1964)

investigated the ease with which preschool Ss utilized the following conceptual dimensions: color, form, size, number, sex type, and similarity of components of the stimuli. Ss, aged 3-1/2 to 6-1/2 years, showed no significant relationship of age to size concepts. Lee concluded, on the basis of his study, that the decreased salience of the popular conceptual attributes of size may reflect the degree to which the child regards this dimension as critical or adaptive in categorizing his environment. Apparently, abstraction of size-attributes requires the child to ignore the other potent and observable attributes of color, form, and meaningfulness. The size of an object is relative to an external measure or to other objects, whereas color and form are judged by intrinsic attributes. The empirical evidence does not support the proposition of a relationship between size and age, and the design of the present study does not permit the determination of relationships of size versus color and form preferences with age over the same age range as has been employed in studies comparing color and form. However, especially in view of Suchman's recent

interest in the size dimension, it seemed reasonable to include size as well as form and color in the present study to determine whether any systematic changes in preference for this dimension did take place over the school year.

The school group in the present study consisted of 5- and 6-year-old children enrolled in Project Headstart classes in a small town in Oklahoma. Each S was given a test of stimulus preference three times, the first administration occurring during the first week of his entry into the program, and the second and third occurring 6 and 10 months later, respectively. In addition, a nonschool group of children not in Headstart classes but eligible to be enrolled was also tested.

The preference test was modeled after the one devised by Suchman and Trabasso (1966a). More specifically, the present task consists of 40 cards, each with 3 two-dimensional geometric figures on it. These cards were presented successively to individual Ss, with instructions to designate the two figures on the card which are "most alike." On 16 of the cards the three

figures vary in form, color, and size, with each figure sharing one attribute with each of the other two such that a match may be made on the basis of form, color, or size. On the other 24 cards, the figures vary in only two dimensions, the third being held constant. On eight of the latter cards, form is held constant, matching thus being possible by size or color; on eight other cards color is held constant; and on the remaining eight size is constant.

It was predicted that the school children as a group would show an increasing preference for form over color with each successive testing. Nonschool Ss, on the other hand, were predicted to show significantly less increase in form preference over this same period of time, if they increased at all. No specific predictions were made for the changes in either group with respect to size versus color and size versus form preferences.

Both the school and the nonschool groups were equally divided among 3 ethnic groups: Anglo, Negro, and American Indian, a secondary purpose of the present study being to determine whether subcultural, racial

characteristics of the Ss are related to either the magnitude of initial preferences or magnitude of the shifts with school experience.

Suchman (1966) administered three color-form choice tests (including one very similar to that of the present study) to 120 Nigerian Ss ranging in age from 3-15 years. Over 90 percent of her Ss at all ages preferred color; not one S preferred form on all three tests. She explained this discrepancy between her results and those of investigators employing Ss from Europe and the United States on the basis of the kind of educational experiences these children had (or did not have). Such an explanation is, of course, similar to that proposed by the present writer.

In the Colby and Robertson (1942) study reviewed earlier, both Negro and Anglo Ss were tested. With MA and IQ held constant, the Negro children were found to prefer color significantly more than did the Anglo Ss. Within the context of the present hypothesis, these results might be interpreted as suggesting that lower class Negro children may be even more deprived than

lower class Anglos of informal cultural experiences that lead to a form preference.

If Suchman's explanation is correct, then one might expect to find that lower class Indian children might also show greater color preference than Anglo Ss, since these Ss are, like Negroes, deprived of many cultural experiences that are available to Anglo children, even those with lower class backgrounds. It was anticipated, therefore, that among nonschool Ss, and among school Ss at their first testing, color preferences might be more marked in the Negro and Indian children than in Anglos. There seem to be no firm grounds, however, to predict that the anticipated change over the school year in the experimental group will be the same or different in amount among the three groups.

C H A P T E R I I

METHOD

Preference Test

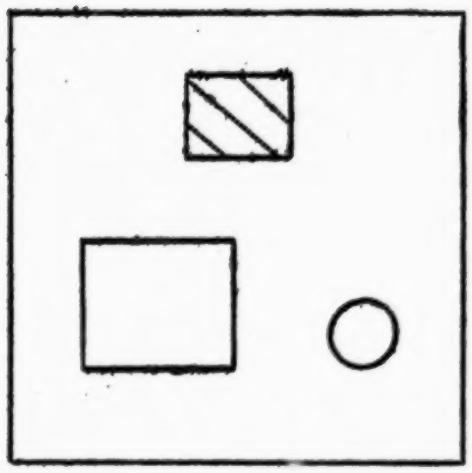
As was stated in the introduction, the preference test was adopted from Suchman and Trabasso (1966a) in order that the results of the present study might be more comparable to past empirical work. The major change made on the task was to place the stimulus figures on cards rather than on slides.

The task consisted of forty 12 inch x 12 inch cards, each card having on it 3 two-dimensional geometric figures arranged in an equilateral triangle. The cards were constructed by pasting figures cut from colored construction paper on white cardboard, and arranged with one figure above and two below. There were four colors used: red, blue, pink, and pale blue. Four geometric forms were employed: circle, rectangle, trapazoid, and bean shape. There were two sizes, large and small. The

dimensions of the stimulus figures were as follows: the diameter of the large and small circles were 4 inches and 2-1/4 inches, respectively; the rectangles were 3-1/2 x 3 inches and 2-1/2 x 1-3/4 inches; the trapazoids were 4-1/2 x 3-1/4 inches and 3-1/4 x 2-1/4 inches; the large bean shapes were approximately 3-1/2 inches high and 4 inches high and 2-1/2 inches wide.

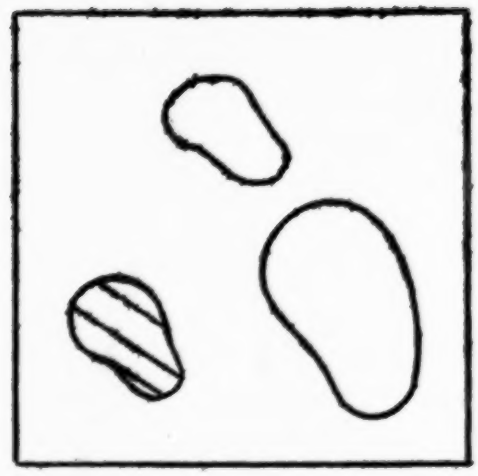
Sixteen of the cards allowed an S to choose any of the three dimensions of form, color, or size. An example of one of these cards is shown in (A) of Figure 1. As may be seen, a correct match may be made on the basis of color, form, or size. Thus, in this example, the S could choose the two rectangles (a form match), the two bottom figures (a color match), or the two small figures (a size match), as being most alike. The other 24 cards form three subsets of eight each, in which one of the dimensions was held constant. An example is given in Figure 1(B), where form is held constant and color and size are varied. An S could therefore match on the basis of color (bottom two figures) or size (two small figures), but not form. Another set of

A



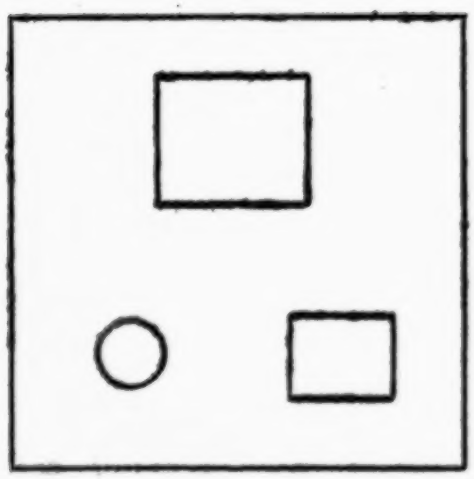
Matching may be done on the basis of form, color, or size.

B



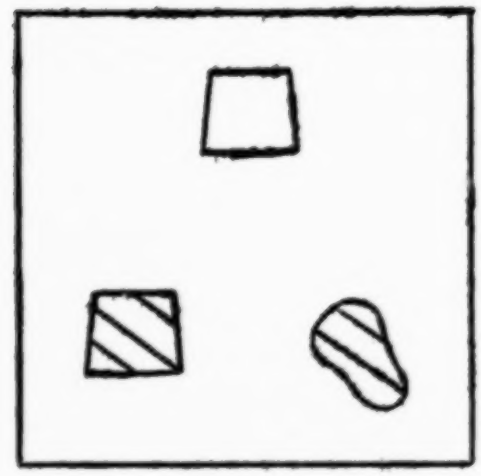
Matching is possible on the basis of size and color, but form is removed.

C



Matching may be done on the basis of size or form, but not color.

D



Matching may be done on the basis of form, or color, but not size.

FIGURE 1

Example of Preference Test Card

eight cards allows S to match on the basis of form and size but not color, as is illustrated in Figure 1(C), and the third subset allows S to match on the basis of form and color but not size, as is illustrated in Figure 1(D). If an S in these latter subsets matched two items that were identical in the dimension held constant among all three stimuli but were otherwise different (e.g., in Fig. 1B, the top and bottom right figures) an error was scored.

Each of the first four cards in the pack of 40 allowed the S to match on the basis of form, color, or size. Thereafter, the order was essentially random, with the restriction that items from a given subset were scattered fairly evenly throughout the pack and none appeared in adjacent positions. Since a preliminary pilot study suggested that card order made little difference in Ss' responses, a finding also reported by Suchman and Trabasso (1966a), all Ss were tested using the same order.

Subjects

The school Ss were students in Headstart classrooms in a small town in Oklahoma, and by definition of the program itself were culturally deprived. The school Ss were equally divided into 3 ethnic groups of 20 Ss each, randomly drawn from the six Headstart classrooms. Two of the teachers were Anglo, two were Negro, and two were Indian. The 60 nonschool Ss were children of comparable socioeconomic background and were listed on the school census as eligible for the Headstart program. The essential requirements for eligibility in the program were that the S would be old enough to enter the first grade by the beginning of the next school year, and that the family income must fall below $3,500 per year. Most of the fathers of children eligible for the program worked at manual labor jobs such as the local carpet factory. The criterion of Headstart eligibility was used as the basis for matching the nonschool group with the school group. Reasons for nonattendance by children from whom the nonschool Ss were selected varied, but usually centered around lack of transportation.

The nonschool Ss were also divided into groups with an equal number of Anglo, Negro, and Indian children in each. The Ss ranged in age from 61-71 months; the mean age for the school group was 66.2 months, and 65.8 months for the school group. The Indians were from the Caddo tribe.

Procedure

Subjects sat opposite E who had asked the S if he would like to play a game. Two children, one Indian in the nonschool group and one Negro in the school group, indicated that they did not wish to play. These Ss were dismissed, and replacement Ss tested. The first card was held up before S and E said: "Do you see these three things? I want you to point to the two that look most alike." Occasionally an S would ask if he were getting the right answers, and was told, "you are doing fine." Other than that, no comment or reinforcement was given spontaneously by E. Ss self-paced their choices, and after each response was shown the next card immediately. Testing continued until S completed his choices on cards.

If S matched two stimuli which were not alike in any way an error was scored. If S made four or more errors on the 40 cards then his results were omitted from the data analysis and replacement Ss were run. Four children were not included in the school sample due to an excess of errors: two Negroes and two Indians. Three Ss were not included in the nonschool group for this reason: all were Indians.

The school Ss were first tested in early September during the first week of Project Headstart. These students had experienced no other form of schooling such as kindegarten; this was their first experience with formal education. The Ss were tested again in the winter, and again in the last month of school. In this manner results can be graphed longitudinally over the first year of school, and changes in preferences noted.

The nonschool Ss, also without prior educational experience, were tested in their homes. They were first tested in the winter, and were again tested in the spring to coincide with the second and third testing of the school group. Unfortunately, it did not

prove to be possible to identify the nonschool Ss in sufficient time to test these children in September. To compensate for this lack, several types of comparisons of the performance of nonschool and school groups are made, including one in which the first and second testing of each group are compared. This contrast is a particularly stringent test of the writer's hypothesis, since the nonschool Ss had the advantage of several months in age and therefore might be expected to exceed the school Ss in maturational level and experience.

In order to see if the differences in size of the figures on the test cards were phenomenologically valid, the 40 cards were given to 20 Ss of comparable age and background. Ten of the children were asked "If any of the figures were not the same size; which ones?" and ten were asked "Which two figures are larger (or smaller) than the other one?" No errors were made, which indicates that the differences in size on the cards was available to the Ss.

At the time of the final testing six Ss had dropped out of school or had moved. Among the nonschool

children, one Anglo and one Indian were no longer available; among the school Ss, one Negro, one Anglo, and two Indians had dropped out. Therefore the earlier scores for these children were also deleted from the analyses.

C H A P T E R I I I

RESULTS

The results of the analyses will be presented in four sections. The initial section of the chapter will deal with the specific hypothesis related to the general question of the study. The last three sections will deal with findings not directly related to the main hypothesis of the study, but which are nonetheless essential.

The General Hypothesis

The first set of data to be examined is the number of form responses made on the total test. Because eight of the 40 cards (C X S) did not offer form as a choice, the maximum number of form responses possible was 32. The mean number of form responses for the school and nonschool group at each testing is plotted in Figure 2. As may be seen, there was only a small increase in the number of form choices over the two testings for the nonschool group. As was predicted earlier, the school

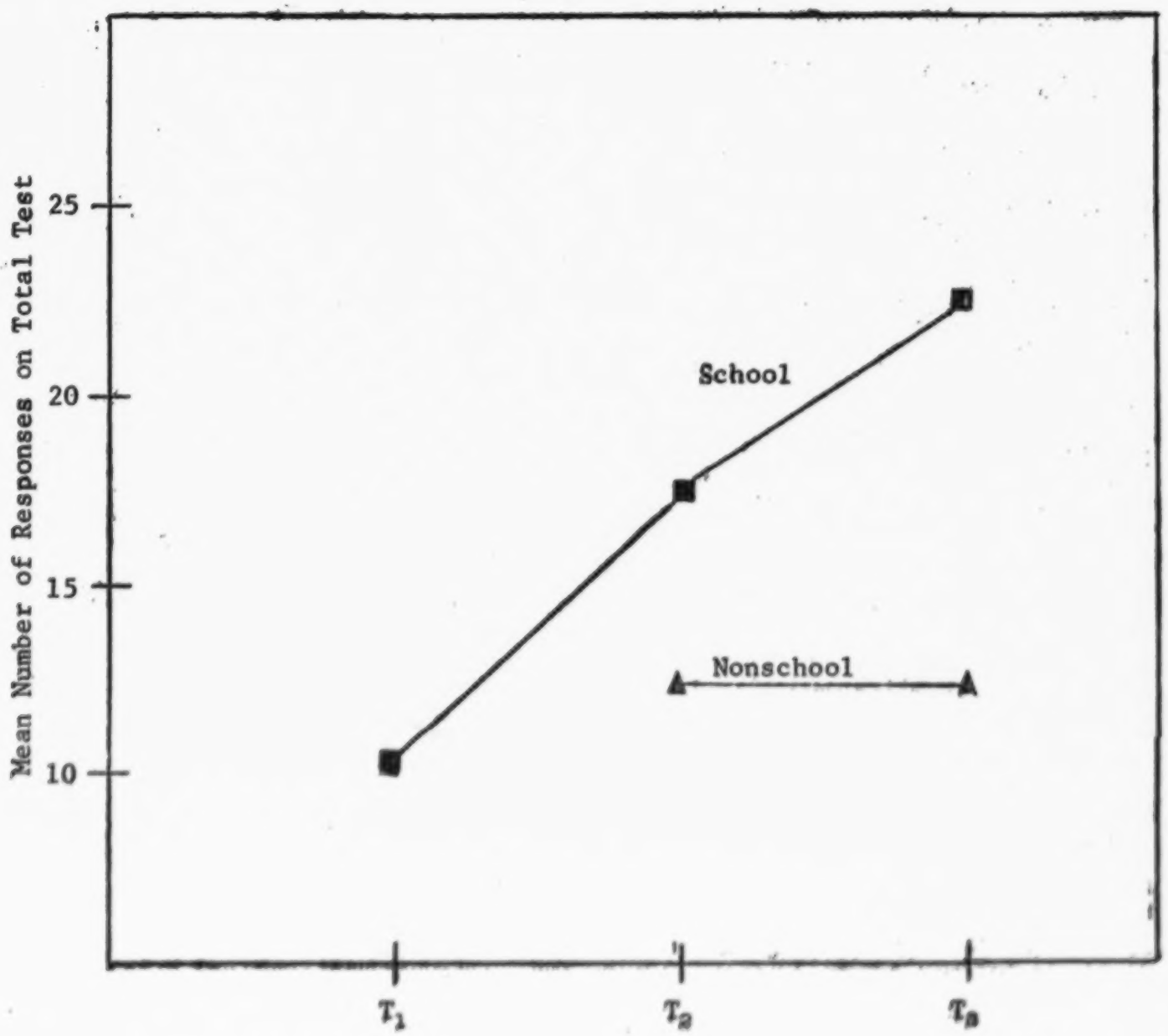


FIGURE 2

MEAN NUMBER OF FORM RESPONSES ON TOTAL TEST AS A FUNCTION OF GROUP OVER TIME

group, in contrast, showed a marked and consistent increase over the school year. Inspection of the means of the three racial groups, reported in Table 1, showed that all three subgroups exhibited essentially the same pattern: a marked increase in form responses over successive testings in the school group and very little in the nonschool group.

Despite the fact that the nonschool group was given their initial testing several months after the initial listing of the school Ss, thus having the advantages of age and experience over the latter group, the results of a t-test showed no significant difference between the school and nonschool groups on the first testing ($p > .05$). For this reason, an analysis of variance comparing the school and nonschool groups on the initial and final testing of each group (thus omitting the middle testing for the school group) was conducted. The results of this analysis, which are summarized in Table 2, indicated that there was a significant interaction ($p < .005$) between the school and nonschool groups and time of testing, as anticipated. The main effect of

TABLE 1

MEAN NUMBER OF FORM RESPONSES ON TOTAL TEST BY RACE AND GROUPS AS A FUNCTION OF TIME OF TESTING

Group		T_1	T_2	T_3
School	Anglo	13.0	19.1	23.0
	Negro	8.06	11.7	19.05
	Indian	10.38	21.0	25.4
Total School		10.39	17.3	22.5
Nonschool	Anglo	---	12.3	13.15
	Negro	---	11.0	12.05
	Indian	---	12.0	15.4
Total Nonschool		---	11.77	13.58

TABLE 2

ANALYSIS OF VARIANCE FOR MEAN NUMBER OF FORM RESPONSES ON TOTAL TEST

Source	df	F-Ratio	P
Between	113		
Race	2	3.03	<.06
Group	1	.73	.60
Race X Group	2	.96	.61
Within	114		
Testing	1	33.96	<.001
Race X Testing	2	3.33	<.04
Group X Testing	1	12.15	<.002
Group X Race Testing	2	.75	.52

time of testing was also significant ($p < .001$), which (inspection of the data suggests) reflects the dramatic shift made by the school group toward more form responses. Finally, two of the terms involving race--the main effect and the race by time of testing interaction--reached or approached significance. These latter results will be discussed in a later section.

The total number of color responses and of size responses given by the school and nonschool groups at each testing are plotted in Figure 3. The absolute number of size responses was found to be small for both school and nonschool groups at the initial testing and to show a minor amount of change in a downward direction over the school year. This implies, of course, that the marked increase in form responses that was observed in the school Ss across testings occurred primarily at the expense of color. This systematic decrease in color responses in the school group may be seen in Figure 3, with the means of the nonschool group remaining quite constant.

As stated above, the maximum number of choices possible for any of the three dimensions is 32, because

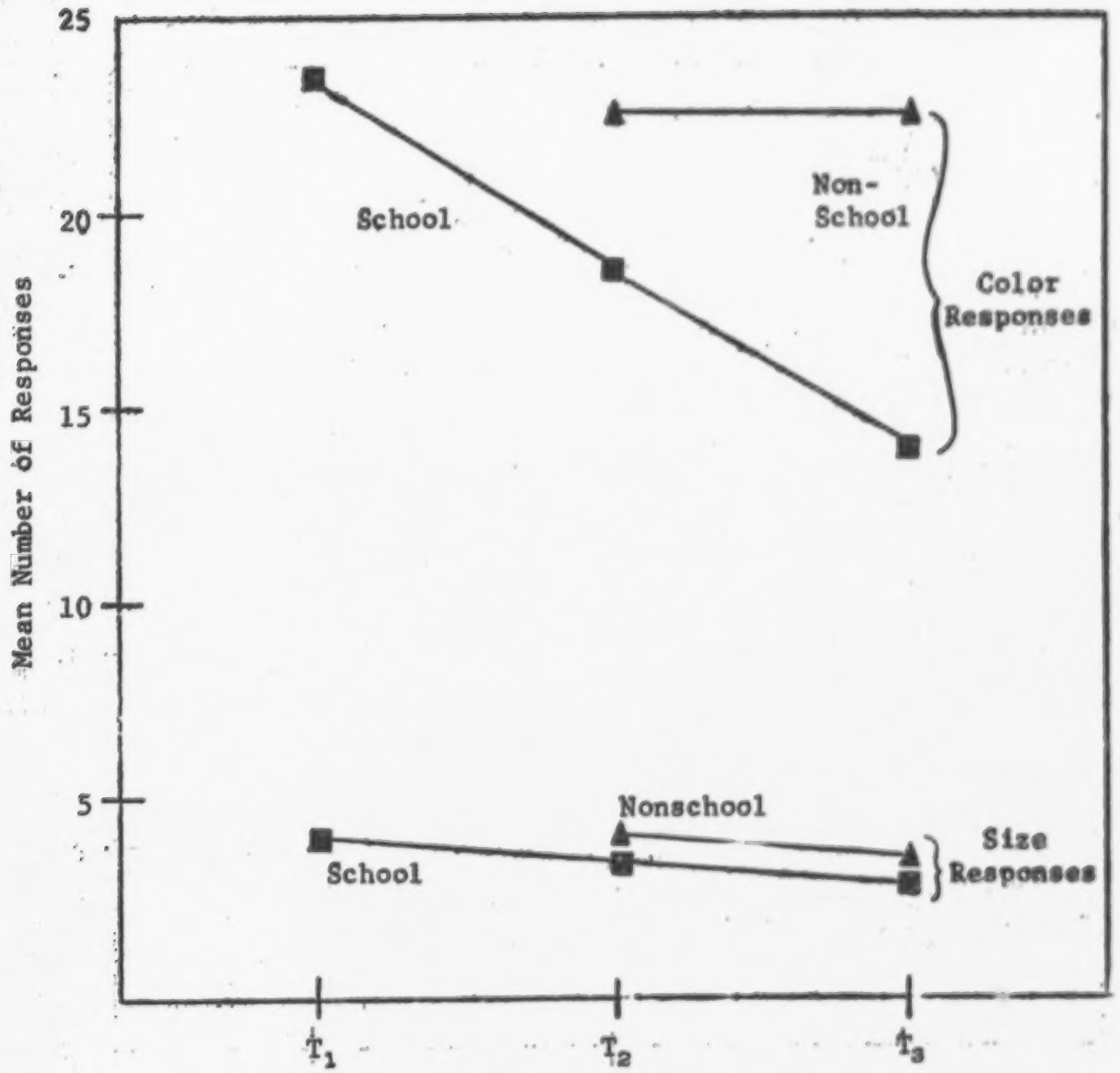


FIGURE 3

MEAN NUMBER OF COLOR AND SIZE RESPONSES ON TOTAL TEST AS A FUNCTION OF GROUP AND TIME

on the other eight cards the dimension is held constant. The 32 cards which compared form may be broken down into three types. Sixteen of the cards compared form, color, and size; eight other cards compared only form and color; and eight others compared form and size. The results of these three sets of scores, to be described in detail below, confirm the conclusions just reached above, which were based on the results of the total test.

Table 3 shows the means for both groups on the 16 F X C X S cards. The number of form responses increased over time for the school Ss at the expense of color choices, while for the nonschool Ss there was very little increase in form choices, as seen in Figure 4. The analysis of variance of the F X C X S form responses may be seen in Table 4, which indicates that the interaction between group and testing was significant ($p < .01$). Figure 5 provides essentially the same information as Figure 3, namely that color choices decreased for the school group but remained at a stable high level for the nonschool group, while size remained low and approximately the same for the two groups.

TABLE 3

MEAN NUMBER OF FORM RESPONSES ON 16 F X C X S CARDS BY GROUP AND RACE AT INITIAL AND FINAL TESTINGS

Group		First Test	Final Test
School	Anglo	5.1	10.1
	Negro	2.16	8.16
	Indian	3.66	11.9
Total School		3.64	10.02
Nonschool	Anglo	4.15	4.94
	Negro	3.7	4.20
	Indian	4.25	5.52
Total Nonschool		4.04	4.89

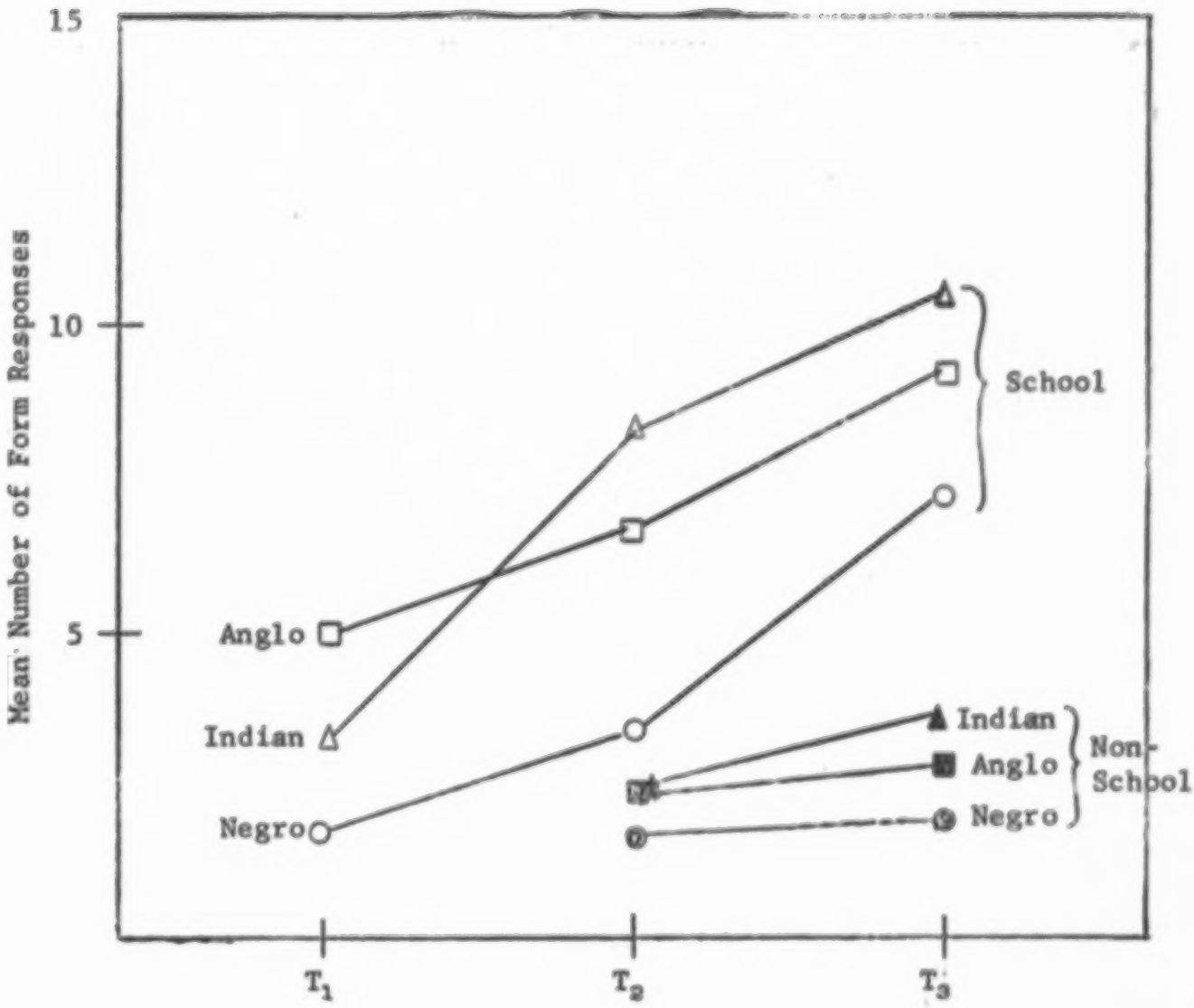


FIGURE 4

THE MEAN NUMBER OF FORM RESPONSES ON F X C X S CARDS AS A FUNCTION OF RACE AND GROUP OVER TESTINGS

TABLE 4

ANALYSIS OF VARIANCE FOR MEAN NUMBER OF FORM RESPONSES ON F X C X S CARDS

Source	df	F-Ratio	P
Testing	1	21.48	.001
Race	2	2.07	.13
Race X			
Testing	2	2.13	.12
Group X			
Testing	1	7.49	.01

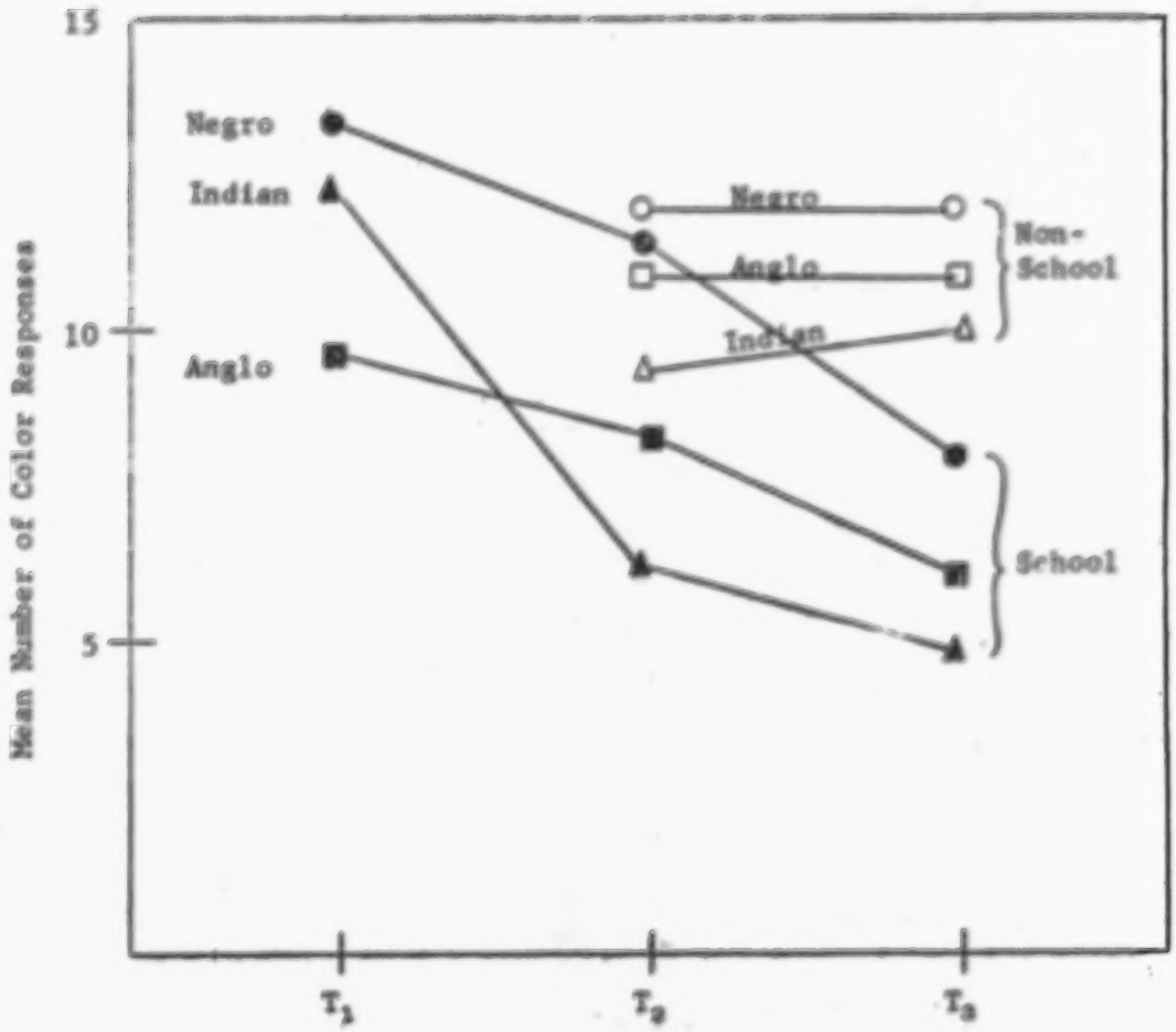


FIGURE 5

MEAN NUMBER OF COLOR RESPONSES ON THE 16 CARDS OF F X C X S COMPARISONS AS A FUNCTION OF RACE AND GROUP OVER TESTING

On the eight F X C cards as seen in Figure 6, the number of form responses increased greatly for school Ss at the expense of color choices. The results of the comparison as seen in Table 5 follow very closely the results of the above data categories. Further, the results indicate that where only form and color were compared, form was increasingly chosen by the school group, and there was little increase for nonschool Ss. The analysis of variance of the results of the F X C cards (Table 6) again shows that the interaction between groups over time of testing was significant ($p < .001$).

For the third data category, 8 cards compared only form and size, as seen in Figure 7 and Table 7. The number of size choices was relatively small for all groups and declined only slightly over time. Thus the trend for the increase in form responses for school Ss over the year observed in comparisons involving color was much attenuated. On this set there was also an increase in form responses for nonschool Ss, reflecting the decreasing number of size responses for both groups over time. The increase was greater in the school group,

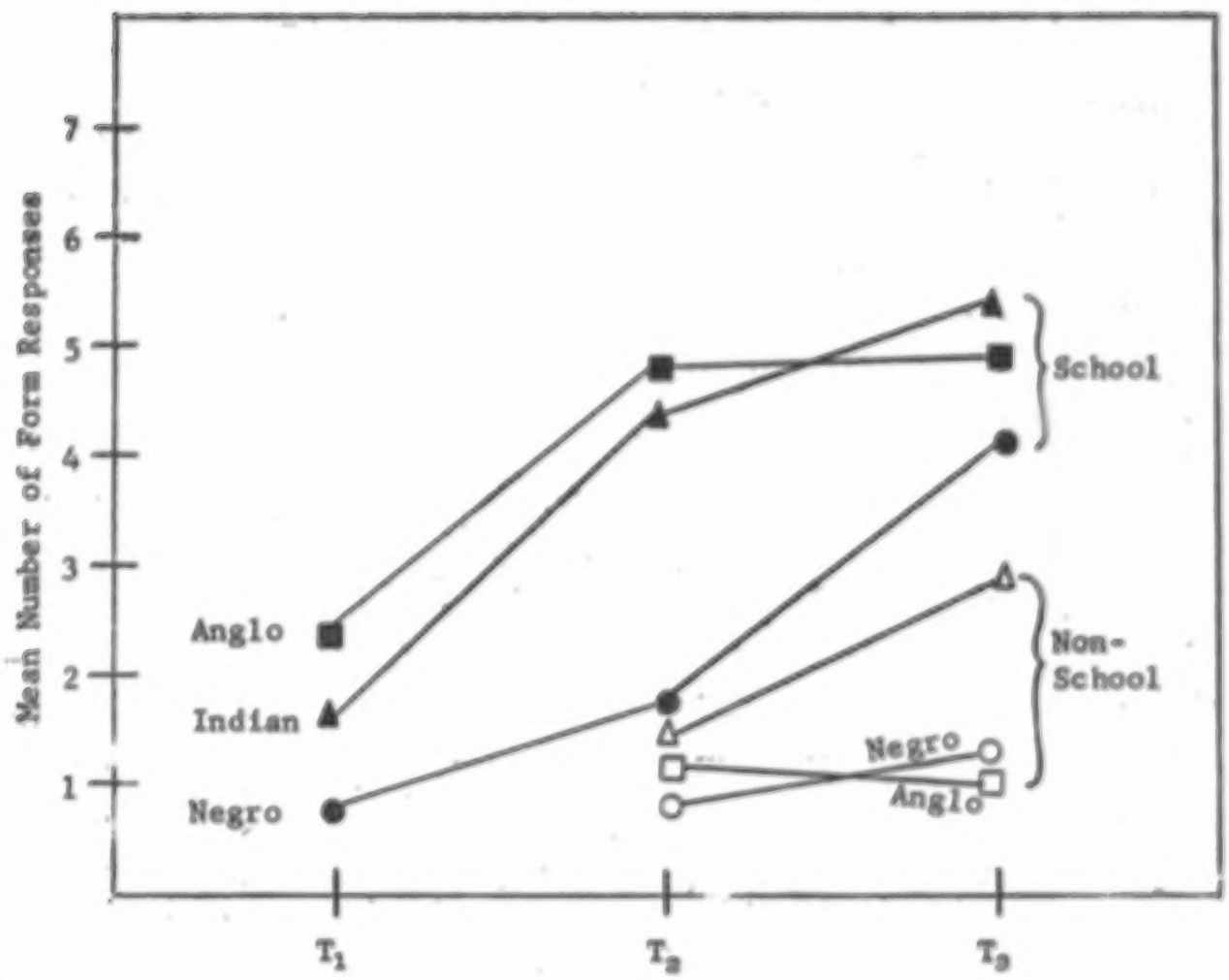


FIGURE 6

MEAN NUMBER OF FORM RESPONSES ON F X C COMPARISONS AS A FUNCTION OF GROUP AND RACE OVER TESTINGS

TABLE 5

MEAN NUMBER OF FORM RESPONSES ON EIGHT F X C CARDS BY RACE AND GROUP ON INITIAL AND FINAL TESTINGS

Group		First Test	Final Test
	Anglo	2.32	5.42
School	Negro	.85	4.31
	Indian	2.11	6.12
Total School		1.74	5.28
	Anglo	1.90	2.15
Nonschool	Negro	1.41	2.10
	Indian	2.30	3.42
Total Nonschool		1.89	2.58

TABLE 6

ANALYSIS OF VARIANCE FOR MEAN NUMBER OF FORM RESPONSES ON F X C CARDS

Source	df	F-Ratio	P
Race	2	4.20	<.02
Group	1	2.63	.10
Testing	1	40.35	<.001
Group X Testing	1	12.89	<.001

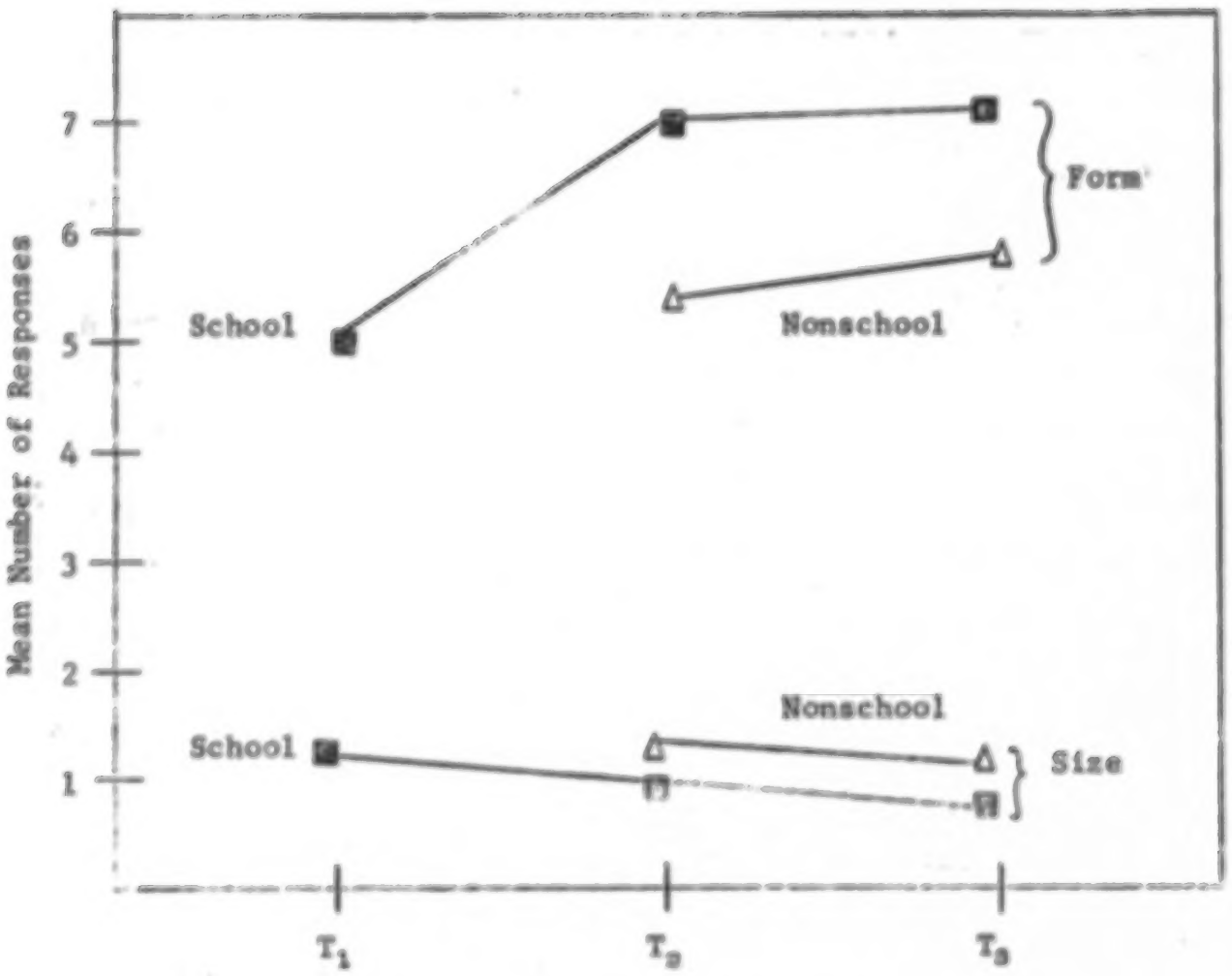


FIGURE 7

MEAN NUMBER OF FORM AND SIZE RESPONSES ON F X S CARDS AS A FUNCTION OF GROUP AND TESTINGS

TABLE 7

MEAN NUMBER OF FORM RESPONSES ON F X S CARDS AS A FUNCTION OF RACE AND GROUP, AT INITIAL AND FINAL TESTINGS

Group		First Test	Final Test
School	Anglo	5.6	7.45
	Negro	5.03	6.7
	Indian	4.67	7.48
Total School		5.03	7.21
Nonschool	Anglo	6.3	6.07
	Negro	5.9	6.15
	Indian	5.01	6.6
Total Nonschool		5.86	6.26

however, as indicated by the near significant interaction between testing and group shown in the analysis of variance reported in Table 8.

Therefore, on all card categories which contained form as a relevant dimension, there was consistently a significantly greater increase in the number of form choices for the school than the nonschool Ss.

Although not directly relevant to the general hypothesis, the C X S comparison is presented in Figure 8. On these 8 cards the number of color responses increased for both groups, and the number of size choices decreased over time for both groups. It would seem, then, that size is a much weaker choice for both groups when compared with color or form, and becomes more so over time.

The trends for the means of the groups, then, strongly support the hypothesis of the study, namely that form responses would gain in frequency over the school year for the school Ss but remain relatively constant for the nonschool Ss. A second type of analysis was done to determine the number of children who showed

TABLE 8

ANALYSIS OF VARIANCE FOR MEAN NUMBER OF FORM RESPONSES ON F X S CARDS

Source	df	F-Ratio	P
Testing	1	14.28	.001
Group X Testing	1	3.72	<.06
Race X Testing	1	4.3	.02

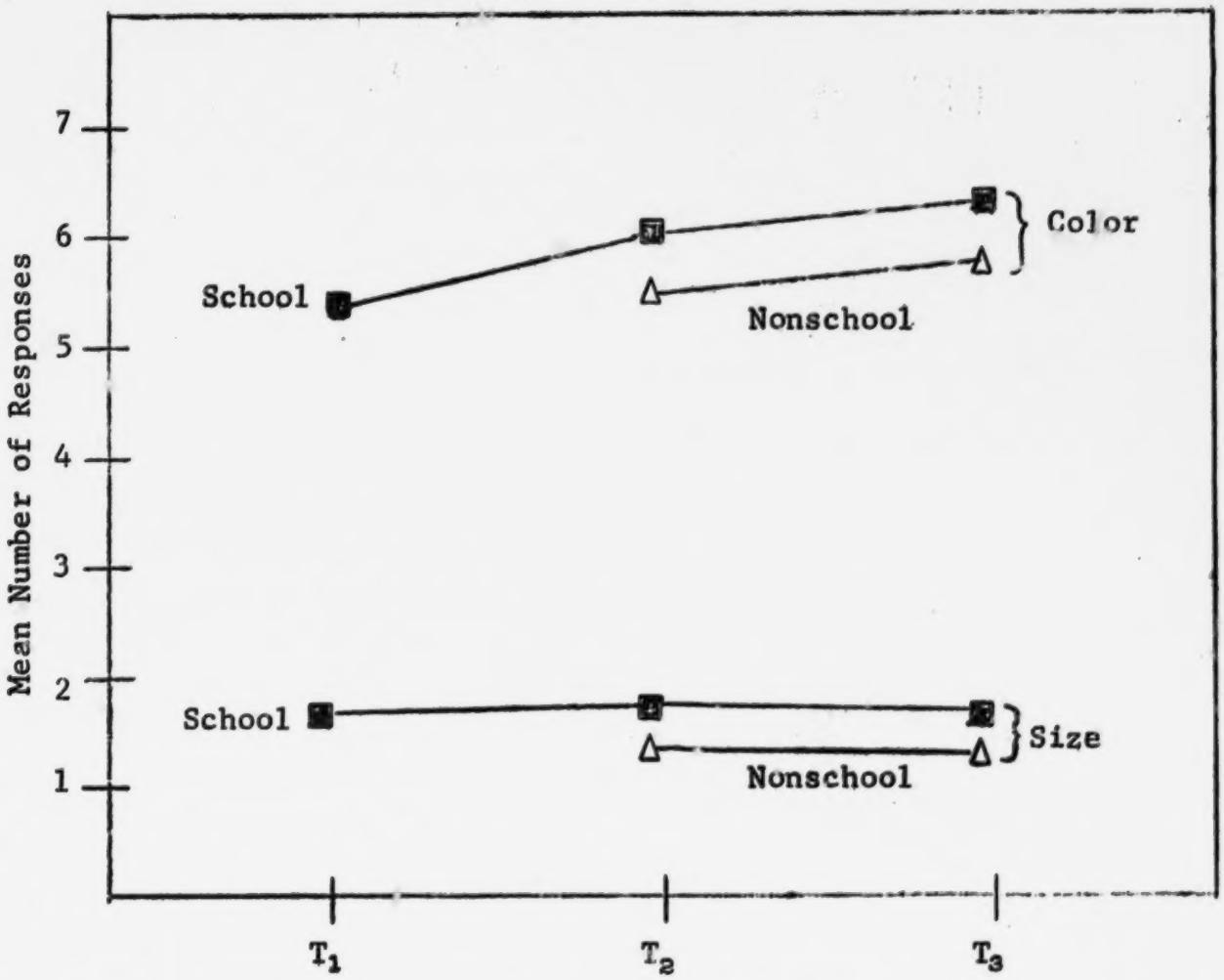


FIGURE 8

MEAN NUMBER OF COLOR AND SIZE RESPONSES ON C X S CARDS AS A FUNCTION OF GROUP OVER TESTINGS

this systematic shift. In this analysis, a score was first obtained for each S on the 24 cards which permitted a choice of form and color (16 F X C X S cards, plus 8 F X C cards). It was arbitrarily decided to categorize a S as form-dominant or color-dominant if one dimension was chosen at least twice as often as the other. If S's score did not reach this 2:1 criterion for either form or color, he was classified as having "neither" dominance. In Table 9 is reported the classification, color-dominant (C), form-dominant (F), or neither (0), given to each S at each testing. It should first be observed that no child in the entire group shifted from being form-dominant at one testing to color-dominant in a subsequent one. Three Ss, however, did shift from no dominance (0) to color-dominance (C), but this was the most radical "reversal" of the anticipated direction of change. For the remaining Ss, patterns of change, if they occurred at all, involved the expected changes from C to 0 or F, or from 0 to F.

The percentage of Ss from each subgroup who were classified into the three categories at each testing is

TABLE 9

INDIVIDUAL Ss, BY GROUP AND RACE, WHO MET THE 2:1 CRITERION OF UNIDIMENSIONALITY, ACROSS TESTINGS

School Ss									Nonschool Ss					
Anglos			Negroes			Indians			Anglos		Negroes		Indians	
T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_1	T_2	T_1	T_2
O	O	O	O	C	F	O	O	F	O	F	O	O	O	O
O	F	F	O	C	O	O	F	F	O	O	O	O	O	F
O	F	F	O	O	F	O	O	F	O	O	O	O	F	F
F	O	F	F	F	F	O	O	F	O	O	O	F	F	F
F	F	F	C	F	F	O	F	F	F	F	O	C	F	F
F	F	F	C	F	F	F	F	F	F	F	F	F	F	F
F	F	F	C	F	F	F	F	F	F	F	F	O	F	F
C	F	F	C	C	F	C	F	F	C	O	C	O	C	F
C	F	F	C	C	F	C	O	F	C	C	C	C	C	C
C	O	F	C	C	F	C	F	F	C	C	C	C	C	C
C	F	F	C	C	C	C	O	F	C	C	C	C	C	C
C	F	F	C	C	C	C	F	F	C	C	C	C	C	C
C	F	F	C	C	C	C	F	F	C	C	C	C	C	C
C	C	O	C	C	C	C	F	F	C	C	C	C	C	C
C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
C	C	C	C	C	C				C	C	C	C	C	C

F = Form Dominant

C = Color Dominant

O = Nondominant

seen in Table 10. In both the school and nonschool groups, approximately two-thirds of the children were color-dominant at the first testing. Although about one-third of the school children retained their color dominance throughout the school year, the proportion of form Ss rose about 12 percent at the initial testing to 61 percent at the final testing. In contrast, only a minor increase in the percentage of children who were form responders were noted. A chi-square analysis (McNemar, 1962) of the number of form-dominant and nonform-dominant (i.e., C or O dominant) Ss at the first and last testings is shown in Table 11. Across the columns is the number of form-dominant Ss at time 1 who, at time 2, remained form-dominant or else became other-dominant; the second row shows the number of other-dominant Ss at time 1 who became form-dominant or remained other-dominant at time 2. The trend for form dominance is statistically significant for the school group ($p < .01$), but not for the nonschool group.

The choice patterns of Ss who were consistent over testings in form or color preference were further

TABLE 10

PERCENTAGE OF Ss MEETING THE 2:1 CRITERION OF UNIDIMENSIONALITY AS A FUNCTION OF RESPONSES FOR FORM AND COLOR ON F X C AND F X C X S CARDS

School	Percentage of Individual Dominance		
	Form	Color	Nondominant
T_1	12.5	67.9	19.7
T_2	39.2	44.6	16.1
T_3	60.8	34.0	5.4
Nonschool			
T_1	17.3	66.1	19.0
T_2	22.5	60.4	17.3

TABLE 11

CHI-SQUARE ANALYSIS OF THE NUMBER OF FORM-DOMINANT AND OTHER-DOMINANT Ss AT FIRST AND LAST TESTINGS AS A FUNCTION OF GROUP MEMBERSHIP

School Ss			Nonschool S		
Time 1	Time 2		Time 1	Time 2	
	Form	Other		Form	Other
Form (7)	7	0	Form (10)	9	1
Other (49)	27	22	Other (48)	4	44
$\chi^2 = 27^*$			$\chi^2 = 1.8$		

*p < .01

analyzed to determine choices between nonpreferred stimulus dimensions. That is, the eight C X S choices were examined for form-dominant Ss and the eight F X S choices were examined for color-dominant Ss. Table 12 compares the percentage of choices for each comparison by preference groups. Color-dominant Ss preferred color more than size. Both school and nonschool color-dominant Ss showed an increase in form responses over time, and a corresponding decrease in size responses. It seems that both groups used size less over time and polarized on either form or color, a result consistently seen in the preceding data. These data do not, however, suggest the emergence of a second order preference, or choice hierarchy, among either group, to the extent that Suchaman and Trabasso (1966a) found among their form-dominant Ss. Their findings showed that form-dominant Ss preferred size as often as color on the C X S cards.

Size

So far, it has been shown that form responses increased over time for the school group but not for the nonschool group, and that color responses decreased

TABLE 12

PROPORTION OF CHOICES OF COLOR, SIZE, AND ERROR RESPONSES BY FORM-DOMINANT Ss, AND FORM, SIZE, AND ERROR RESPONSES BY COLOR-DOMINANT Ss, AS A FUNCTION OF TIME AND GROUP

Group	Initial Test			Final Test			Total		
	Form	Size	Error	Form	Size	Error	Form	Size	Error
Color-Dominant Ss on F X S Cards									
School	54.3	23.8	21.7	82.7	8.4	7.8	68.5	16.1	15.5
Nonschool	70.8	18.60	10.8	76.4	13.2	10.3	73.5	16.0	10.5
Form-Dominant Ss on C X S Cards									
School	66.2	28.7	5.1	75.0	24.6	1.0	70.6	26.6	2.8
Nonschool	63.8	31.2	5.0	75.0	20.2	4.8	71.1	24.0	4.9

whenever form responses increased, at a rate corresponding to the increase in form responses. It has been noted above that size decreased on all card types comparing size. It was expected that since size is not as relevant a dimension as form and color, it would be a poor third choice on initial testings for all Ss. Further, it was anticipated that the number of size responses would not increase over time for any group, and therefore would be a poor third choice on the final testings. Figure 9 shows this to be the case.

Errors

This section will deal with the number of errors committed on the test. On 24 of the cards it was possible for an S to make an error, i.e., to match two figures that were not alike in any way. If more than 4 errors were made the S was removed from the sample and replaced. In other words, the S was permitted only half of the number of errors which would be predicted on the basis of random choices. As stated earlier, four children (2 Negro and 2 Indian) were replaced in the school group, and three children were replaced in the nonschool group

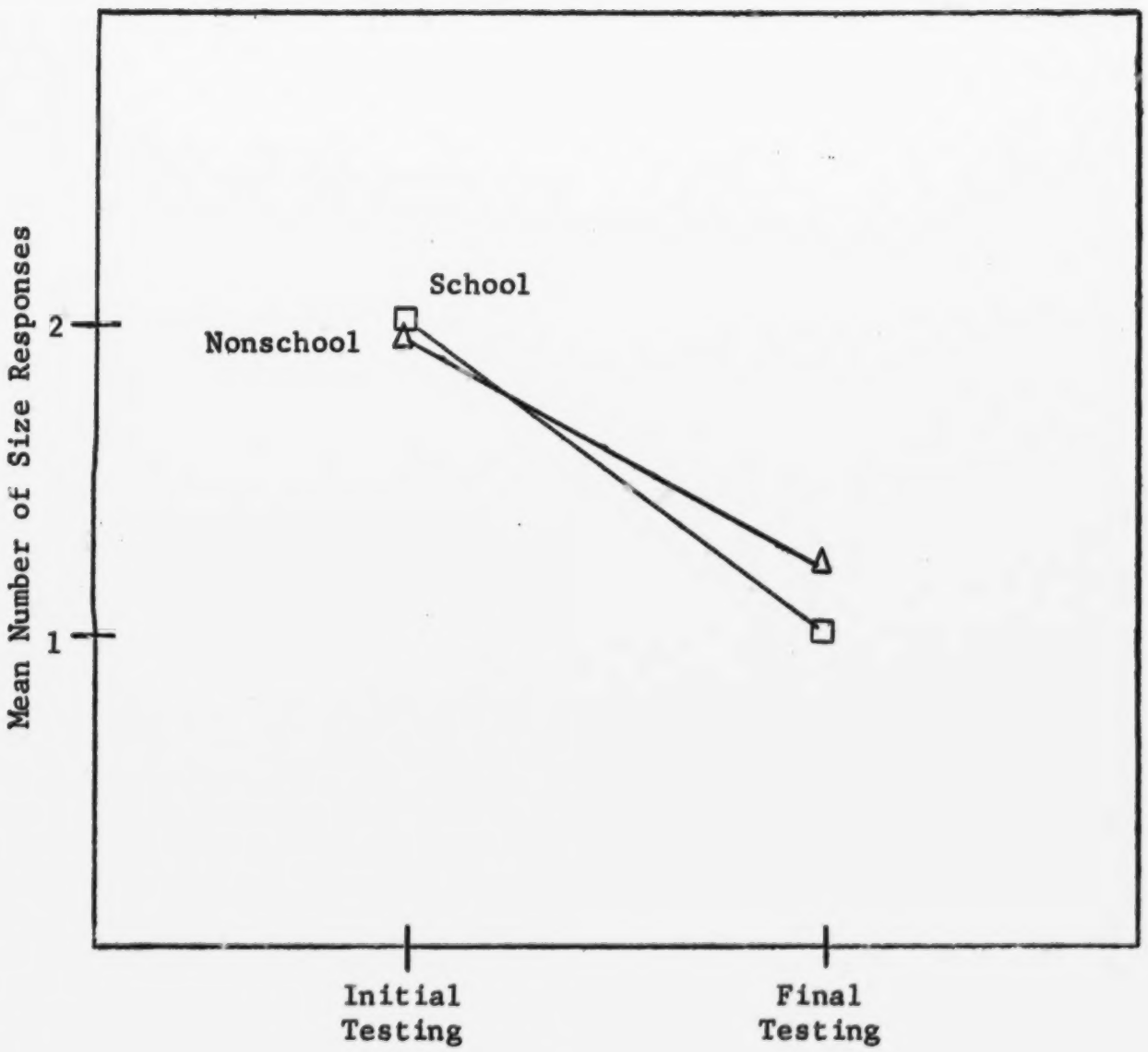


FIGURE 9

MEAN NUMBER OF SIZE RESPONSES ON TOTAL TEST
AS A FUNCTION OF GROUPS OVER TESTING

(3 Indians). These replacements took place at the initial testing; no S made an excess of errors on later testings.

It would seem reasonable to anticipate that the number of errors would decrease over time for all Ss simply as a matter of increased familiarity with the test and testing situation. This expectation was born out by the data in Table 13, which indicates that the number of errors decreased for both groups. The analysis of variance of these means, seen in Table 14, reveals that the overall decrease in errors is significant ($p < .001$). Figure 10 shows that at the initial testings more errors were committed by school Ss than by non-school Ss. Perhaps the excitement of the first week of school was a factor in that difference. At the second testing, both groups made almost the identical number of errors, and by the third testing the school Ss had reduced even further the number of errors made on the test, the mean number being less than one.

Another interesting result concerning the number of errors committed is found in Table 12. These data

TABLE 13

MEAN NUMBER OF ERRORS COMMITTED ON TOTAL TEST AS A FUNCTION OF GROUP, RACE, AND TESTING

Group		T_1	T_2	T_3
School	Anglo	2.73	1.15	.40
	Negro	2.2	1.7	1.01
	Indian	1.9	.9	.25
Total School		2.24	1.25	.55
Nonschool	Anglo	--	1.4	1.3
	Negro	--	1.3	1.2
	Indian	--	1.8	1.3
Total Nonschool		--	1.50	1.25

TABLE 14

ANALYSIS OF VARIANCE FOR MEAN NUMBER OF ERRORS ON TOTAL TEST

Source	df	F-Ratio	P
Testing	1	18.8	<.001
Group X Testing	1	6.56	<.02

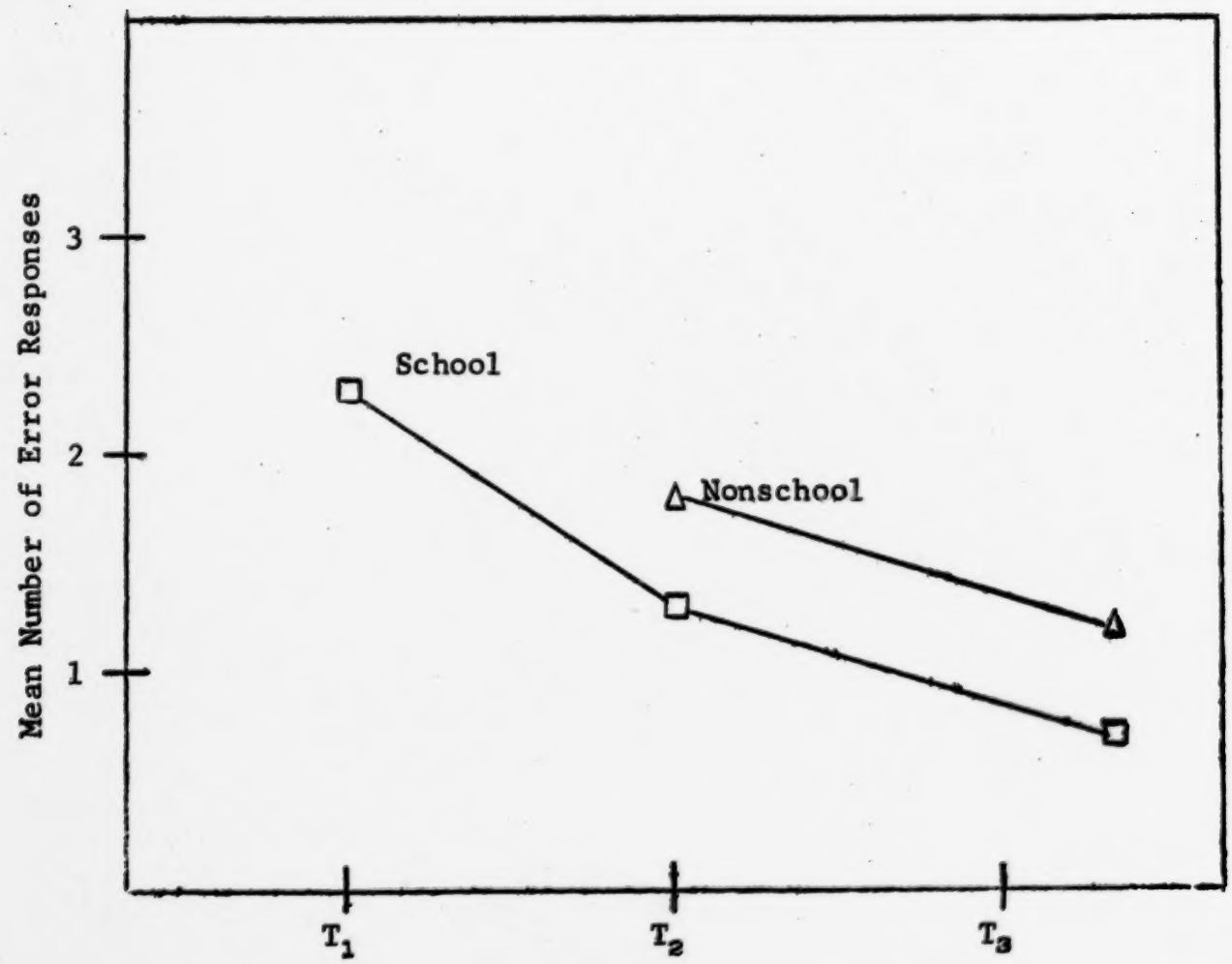


FIGURE 10

MEAN NUMBER OF ERRORS COMMITTED ON THE TOTAL TEST
AS A FUNCTION OF TESTINGS AND GROUP

indicate that color-dominance Ss made more errors when they could not respond to color, than did form-dominant Ss when their preferred dimension was removed. In other words, form-dominant Ss seemed better able to deal with other dimensions, i.e., color and size, than color-dominant Ss could deal with other dimensions, i.e., form and size. Form-dominant Ss, both school and nonschool, made significantly fewer errors than both groups of color-dominant Ss. At the final testing, a hierarchy tended to emerge, with form-dominant school Ss committing the least number of errors, form-dominant nonschool Ss next, color-dominant school Ss and color-dominant nonschool Ss making the next-to-most and most errors, respectively.

Race

The final variable to be examined is that of race. It will be recalled that three racial groups were included in the present study: Anglo, Negro, and Indian. On the basis of previous research, it was anticipated that among the nonschool Ss, and among the school Ss at

their first testing, color preferences would be more marked in the Negroes and Indians than in the Anglos.

The analysis of variance for total form responses, found in Table 2, reveals that there is a significant ($p < .04$) interaction between race and time of testing. This interaction can be seen in Figure 11, which reveals that Indian Ss increased more sharply in form preference than did the other two races. The main effect of race is of borderline significance ($p < .06$), and reflects the fact that for both groups and at all testings, Negro Ss made fewer form choices than either Indians or Anglos.

The results as graphed in Figure 12 indicate that in both the school and nonschool groups Negro Ss preferred color more than Anglos or Indians. In the school group, Negro Ss made more color responses than either Anglos or Indians at all testings, and were slower to make the shift to form (Fig. 13). In fact, they did not make much of a shift toward more form responses by the second testing. By the final testing, a large shift was made toward more form responses,

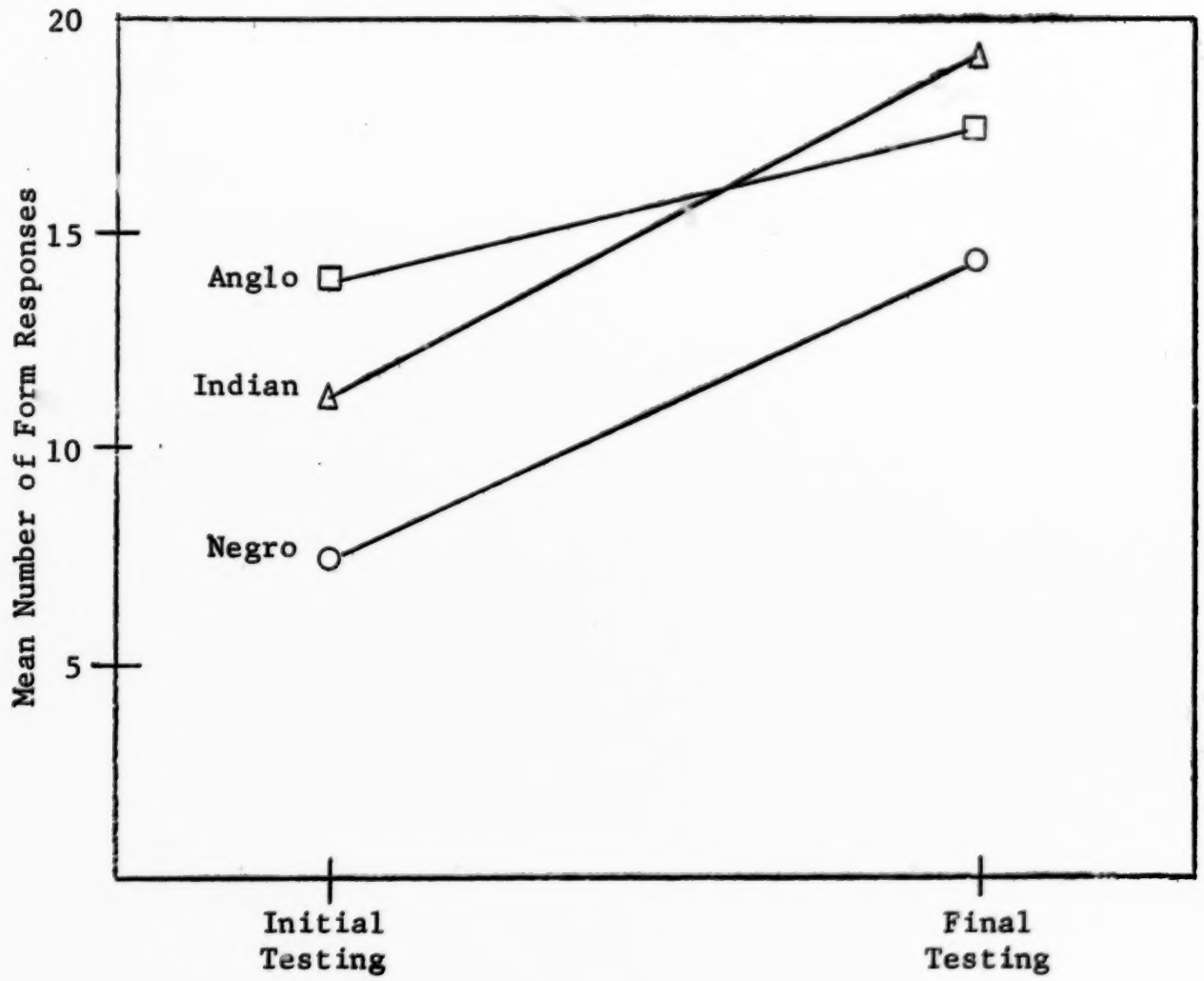


FIGURE 11

MEAN NUMBER OF FORM RESPONSES ON THE TOTAL TEST AS A FUNCTION OF RACE AND TESTINGS

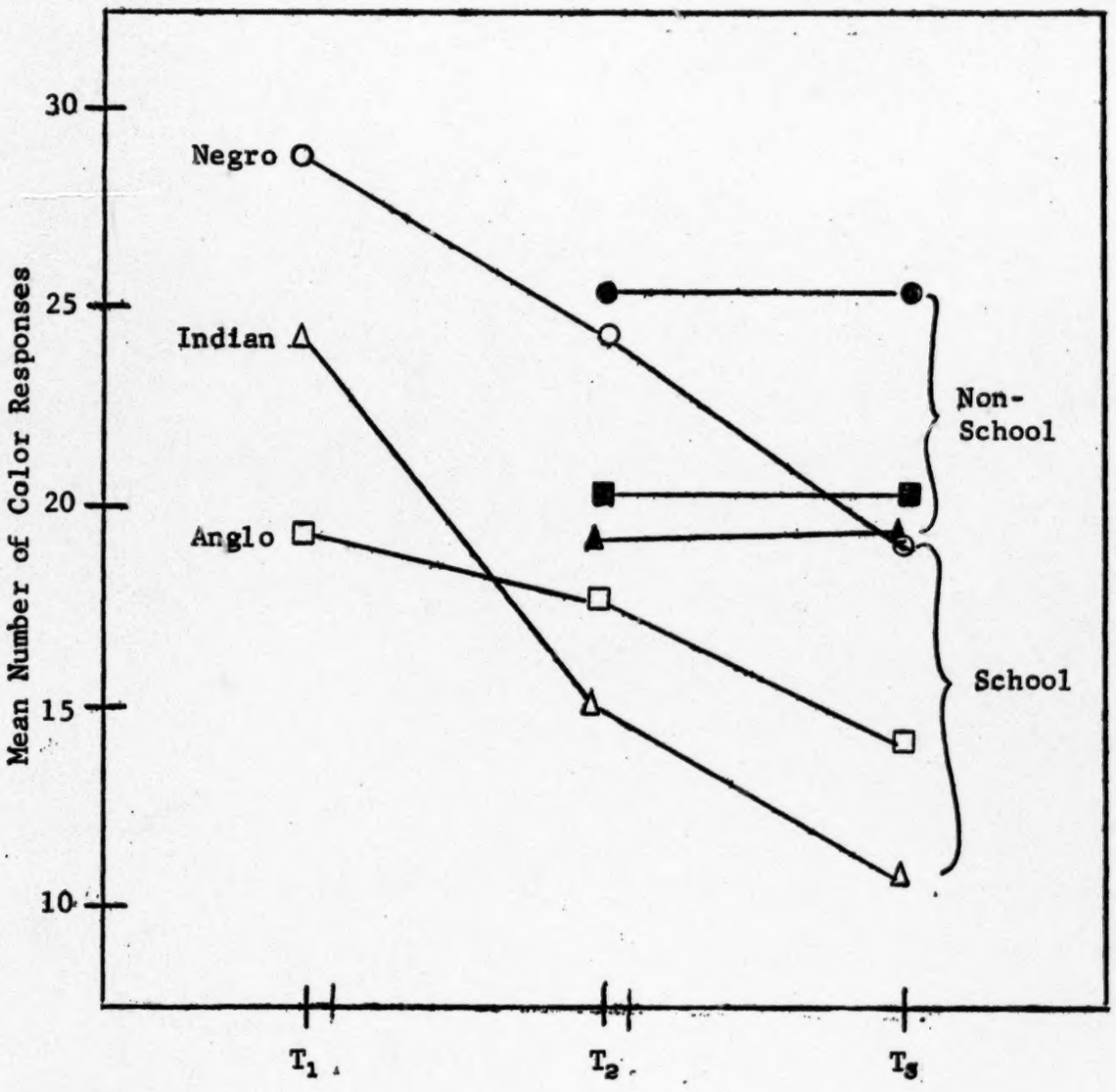


FIGURE 12

MEAN NUMBER OF COLOR RESPONSES ON TOTAL TEST AS A FUNCTION OF GROUP, RACE, AND TIME OF TESTING

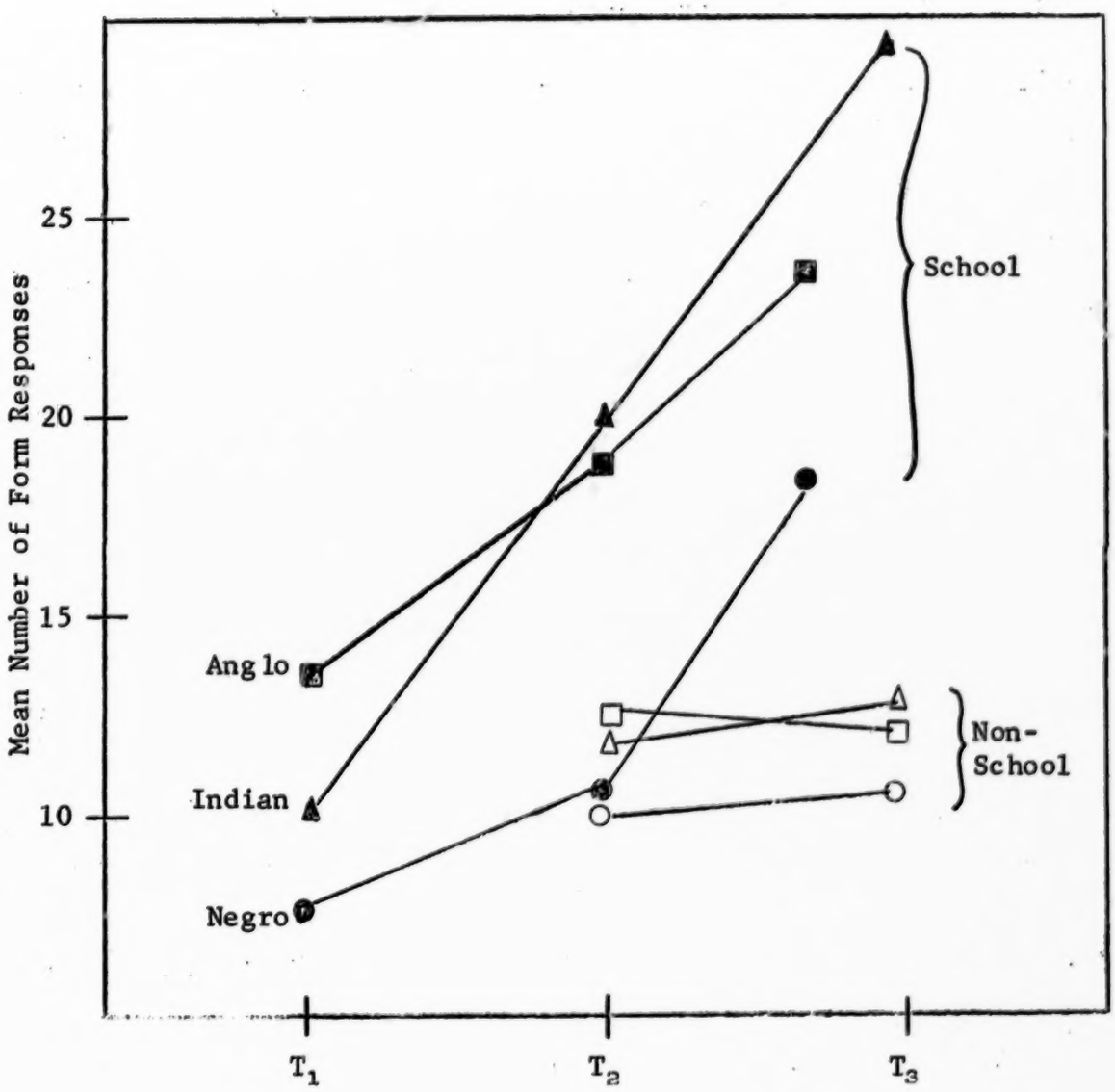


FIGURE 13

MEAN NUMBER OF FORM RESPONSES ON TOTAL TEST AS A FUNCTION OF RACE AND GROUP OVER TESTINGS

although still much less dramatic than that of the Anglo and Indian Ss.

In the nonschool group, the Negro Ss did not differ from the Anglo and Indian Ss in the number of form responses made at either testing, although they scored fewer. Contrary to expectations, Indians did not exhibit a greater color preference than Anglo Ss.

Another racial difference which was noted (Fig. 11) was that school Indians made a more rapid shift toward form preference than did either Anglo or Negro Ss. This interaction between race and time of testing was significant ($p < .04$), as shown in Table 2. Thus, while Negro Ss showed the anticipated differences from Anglo children, consistently exhibiting higher color preferences, no simple differences of this nature were found between Indians and Anglos.

C H A P T E R I V

DISCUSSION

As shown in the preceding chapter, the number of form responses made by the school group significantly increased over testings on all card types, whereas the nonschool group made no significant increase in form responses on any card type. Thus, the results of the present experiment appear to support the general hypothesis of the study, namely that the shift from color to form would take place within the school group, but not within a nonschool group of comparable age, race, and socioeconomic background. The obvious conclusion to be drawn is that within the classroom setting an S undergoes certain experiences which cause him to choose form over color, whereas he chose color over form prior to those experiences. Although the present investigation does not allow one to identify specifically the kinds of training that influenced the change, it seems reasonable to speculate that the children were trained to pay more

attention to form and less attention to color. The shift, then, is probably an adaptive response to the demands of the classroom. That the shift is pertinent to the child is indicated by the fact that once the shift was made in the present study, it did not reverse itself, as shown in Table 14. Further, nearly all investigations done in the area have found that most adults and older children prefer form over color, which suggests that the shift to form is an enduring one. However, the results of a pilot study conducted by the author suggest that form preference is not irreversible. The Headstart sample in that study included 17 Negroes, who, when tested again in September <u>after</u> three months of vacation, had reverted to color-dominance.

Several studies indicate that training can influence stimulus preference. Lu (1967) performed a study designed to investigate conditioning as a factor in perceptual preference. The <u>S</u>s were 10 normal infants with CA's of less than one year and 10 retardates with MA's of less than one year. Both groups were randomly divided into experimental and control groups, and

individually placed within a test chamber where duration of eye fixation could be measured. The stimuli were patterns in black and red, illuminated by either a red or white bulb. The experimental group was subjected to the conditioning procedure of pairing a red light with food. Stimulus preference was determined by time of fixation. The results provided support for the prediction that the stimulus preference of infants, as well as retardates with infant mentality, could be influenced by conditioning.

Corah (1966) studied the effect of instruction and performance set on color-form perception in young children ranging in age from 42-67 months. The point of the study was to determine if instructions or practice would influence the responses of young children on a color-form test. There were four experimental conditions: in two there was an attempt to induce form or color sets through practice trials on form or color tasks prior to administration of the color-form test; in the other two experimental conditions, the examiner attempted to create a form or color response set through

the wording of his instructions, e.g., "which one of these colored things is most like this one?" The results showed that the instructional color-set group did not differ from the control group. On the other hand, the performance color set, or practice with the color task, produced a marked increase in color responses. Both the instructional and performance form-sets produced results of marginal significance; the author suggested that these two form sets would have shown an even more pronounced influence if more than only eight trials had been given. Thus, a stimulus preference was influenced significantly with only a minimal number of training trials.

The two studies cited above thus suggest that the shift from color to form could well come about as a result of form-conditioning within the classroom, as when the teacher repeatedly calls attention to the configuration of the alphabet letters, the shape of numbers, etc.

Turning to the performance of the racial groups, school Negroes were not found to shift toward form as rapidly as the other school Ss, and in fact, within the

school group itself preferred significantly more color ($p<.03$) than Indians or Anglos. It was stated earlier that Negroes may not acquire the informal form-training before entering school that other children might acquire. If true, this may mean that these children were not as familiar with form stimuli. In this connection, Gibson (1959) suggested that repeated presentation of a complex stimulus object will permit discrimination of its invariant properties, which in turn produces perceptual stabilization.

For a child to be familiar with stimulus objects is, in a sense, to have experienced training with its dimensions. Covington (1967) proposed that the superior performance of upper-status children on IQ tests occurs partly because these Ss are more familiar with the test-item content than are lower-status Ss. This is very close to what the present writer is suggesting, that familiarity with stimuli, i.e., the form characteristics of a stimulus object, has effects on how an S will deal with the form dimension on other objects. Covington exposed both upper- and lower-class white

kindergarten Ss to stimulus elements from a perceptual-discrimination test. He found that after direct familiarization with the test item content, lower-class S improved in discrimination performance to a greater degree than upper-class Ss. It is important to note that the stimulus elements were drawings of common objects, and that color was not a factor. Through familiarization with the form dimension of the test, children were able to assess its meaningfulness and become more proficient in dealing with it when presented with similar material later on. Covington contended that familiarity was the most important factor in his study. Within the present investigation, it may be argued that the school children were, during the course of their school experience, becoming more familiar with the form dimension and its meaningfulness in discrimination. The nonschool Ss, on the other hand, were not afforded the opportunity to learn that the form dimension was relevant in perception, nor where they afforded the practice in using it.

Another possibility is that lower-class Ss are initially deficient, not so much because they lack an

acquaintance with the specific type of content, but rather because they are simply less able to make refined and complex discriminations. If familiarization allows an S to transfer to other discrimination exercises in which the content was quite different, then the possibility that familiarization allowed a child to practice form discrimination is tenable.

Though not as plausible, there is the possibility that some truth lies in the common folklore which states that Negroes like colors more than other people do. Such a statement contends that Negroes have some congenitally-acquired disposition for color. Or, some cultures may, by historical circumstances, emphasize and use colors more than other dimensions, it becoming an acquired characteristic.

As stated above, it had been expected that Indian children would make fewer form choices than Anglos, but the results indicate that this is not the case. Tentatively, the writer concludes that probably the basic assumption that lower-class Indian children

are more culturally deprived than lower-class Anglo children, is not correct.

The analysis of errors committed on the test allows two generalizations to be made. Over time, the total group of Ss decreased significantly in the number of errors committed. This reduction would be expected on the basis of practice and experience with the test situation. The other conclusion is that color-dominant Ss made more errors when their preferred dimension, color, was absent. This finding seems to indicate that color-dominant Ss had not yet begun to use form, and were thus relatively unfamiliar with that dimension. Form-dominant Ss, on the other hand, at one time preferred color over form, and thus have had a good deal of practice with that dimension. Nevertheless, form-dominant Ss did experience some difficulty when form was removed as a dimension.

An implication of the findings of the present investigation and prior studies of color-form preference for education is that color-dominant children are at a disadvantage in comparison to form-dominant children upon

entering school, as they have not yet learned to pay attention to the more pertinent, configurational aspects of the classroom environment. It follows that children who make the shift more slowly will also be at a disadvantage. The study by Suchman and Trabasso (1966b), cited earlier, indicated that color-dominant Ss made more errors than form-dominant Ss when form was the relevant variable in a discrimination task.

A final comment should be made on the size variable. On all card types which included size as a dimension, size was chosen very few times. There were no Ss who were size-dominant, i.e., chose size twice as many times as form or color. Apparently, size is not as relevant a variable for the young child as form and color, and becomes even less relevant over time.

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V I T A

Charles Mac Spellmann, the son of Nan James Spellmann and Rudolph Randal Spellmann, was born in Baton Rouge, Louisiana, December 15, 1938. He grew up in various towns across Texas, and graduated from Cuero High School, Cuero, Texas, in 1957. He attended Southwestern University and received the degree of Bachelor of Arts with a major in sociology in May of 1961. He undertook graduate studies in psychology at The University of Texas that summer, and completed the degree of Master of Arts in August of 1963. He accepted the position of Executive Director of the Austin Cerebral Palsy-Center, which he held until June of 1965. At that time he returned to graduate study at The University of Texas. In September of 1966 he received an Office of Education Fellowship in Developmental-Social Psychology, which he presently holds. He married the former Ellen Lucille Ellis of Three Rivers, Texas, following his second year at Southwestern. The Spellmanns have four children: Mack, born 1960; Christine, born 1961; Paul, born 1965; and Jamie, born 1967.

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